QUICK REFERENCE FOR STATUS OF ENVIRONMENTAL INDICATORS					
Name and EPA I.D. Number	Location (City or Town)	Current CA725 Decision	Current CA750 Decision	If Current Decision is Negative, Projected Date for Positive EI	
				CA725	CA750
Blackman Uhler Chemical Company SCD 003 349 065	Spartanburg, South Carolina	YE	NO		9/04

DATE: March 15, 2004

SUBJ: Evaluation of Blackman Uhler Chemical Company's status under the RCRIS Corrective Action Environmental Indicator Event Codes (CA725)
EPA I.D. Number: SCD 003 349 065

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I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of Blackman Uhler Chemical Company's status in relation to the following corrective action event codes defined in the Resource Conservation and Recovery Information System (RCRIS):

1) Current Human Exposures Under Control (CA725),

Director is required prior to entering this event code into RCRA Info. Your concurrence with the interpretations provided in the following paragraphs and the subsequent recommendations is satisfied by dating and signing at the appropriate location within Attachment 1.

II. HISTORY OF ENVIRONMENTAL INDICATOR EVALUATIONS AT THE FACILITY AND REFERENCE DOCUMENTS

This particular evaluation is the second evaluation for Blackman Uhler Chemical Company. The earlier Environmental Indicator Evaluation was completed December 21, 1997. Data generated during Blackman Uhler's Phase I and II RCRA Facility Investigations (dated July 1995 and August 1997, respectively) confirmed the presence of soil and groundwater contamination above health-based concentrations at the site. Because of the potential for human exposure to waste sludge remaining at the surface of several inactive wastewater lagoons (SWMU 9) and in the area of closed lagoons (SWMUs 6,7, 8), a score of CA 725 NO was assigned during the December 31, 1997 Environmental Indicator Evaluation.

Blackman Uhler Chemical Company operates three bedrock recovery wells to control groundwater contaminant plume migration. The groundwater contaminant plume extends to both eastern and western property boundaries and contamination within the saprolite and bedrock aquifers was documented beyond the western property boundary during the Phase II RCRA Facility Investigation. Because the ability of the operating groundwater recovery system to halt further offsite migration is unknown, groundwater releases at Blackman Uhler were considered to be uncontrolled during the first Environmental Indicator Evaluation in 1997. Prior to September 2004, Blackman Uhler will be reevaluating the effectiveness of the existing groundwater recovery system to control contamianant migration. If necessary, the existing groundwater recovery system will be optimized in order to meet the CA 750 Migration of Contaminated Groundwater Under Control criteria. The CA 750 Migration of Contaminated Groundwater Under Control criteria in not part of this evaluation.

III. FACILITY SUMMARY

Blackman Uhler Chemical Company is located approximately two miles southeast of the city of Spartanburg, South Carolina in Spartanburg County. Blackman Uhler manufactures textile dyestuffs and specialty organic chemicals. There are six major production areas at the facility: the nitration process area; the mixing and presscake process area; the specialty chemical manufacturing area; the pigment inks production area, the disperse dyestuff production, and the dyestuff naphthol production area. Raw materials used for dyestuff production include: naphthol, dye acids and salts, acids, bases, solvents and aromatic compounds.

The facility is fenced and Blackman Uhler employs security personnel to guard the entrance to the manufacturing area and waste management areas of the plant. Blackman Uhler no longer operates a hazardous waste treatment unit at the Spartanburg facility. The regulated unit, a lagoon, was certified closed November 3, 1987 and Blackman Uhler conducts groundwater monitoring and corrective action under a hazardous waste permit for postclosure

care.

The semi-volatile constituent, 5-Chloro-2-methyl benzenamine is the primary soil/groundwater contaminant at Blackman Uhler in both concentration and distribution. A dye intermediate, there is no toxicological data available for 5-Chlor-2-methyl benzenamine. There is some toxicological data available, however, for a structurally similar compound, 4-Chloro-2-methylaniline (CAS No. 95-69-2). Because this proposed surrogate (4-Chloro-2-methylaniline) is a carcinogen, associated risk-based concentrations associated with it are significantly lower than risk-based concentrations associated with other contaminants detected at the site.

Remedial activities at Blackman Uhler Chemical Company, to date, have focused on removing wastewater treatment sludge and contaminated subsoil from five former wastewater treatment lagoons (SWMUs 2, 3, 4, 10, 13), and one stormwater retention basin (SWMU 14) and consolidating the waste within a Corrective Action Management Unit (CAMU). Blackman Uhler has consolidated excavated remediation wastes over SWMUs 6, 7, and 8, effectively capping these units in place. The permanent cap consists of two feet of compacted clay, overlain by a high density polyethylene liner. A drainage layer and vegetated cover rests on top of the high density polyethylene liner. A passive soil vapor extraction system has been designed to treat the volatile constituents within the consolidated and underlying wastes at the CAMU.

IV. CONCLUSION FOR CA725

In 1999 Blackman Uhler Chemical Company completed a quantitative, site-specific risk assessment to better evaluate the hazards associated with exposure to chemicals present in buried wastewater treatment sludge and contaminated subsoils at the site. Nine exposure units were identified for surface and/or subsurface soil and these exposure units correspond to SWMUs 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 26 and the Building 8 Area of Concern. Given an industrial exposure scenario, the quantitative, site-specific risk assessment indicated that, except for SWMUs 6, 7, 8, and 9, further investigation and/or remediation was generally not warranted. At all units, the cancer risk was estimated to be within, or below the range of $1x10^{-6}$ to $1x10^{-4}$ which is used as the point of departure for making risk management decisions at chemical release sites. On September 4, 2003, SWMU 9 was fenced and signs posted to prevent human exposure. Because Blackman Uhler has constructed the initial cell of the CAMU over SWMUs 6, 7 and 8, the risk of exposure to subsurface waste and contaminated subsoil at SWMUs 6, 7 and 8 by a construction worker is only hypothetical; there are currently no completed pathways of exposure at the site to units that would represent a hazard to human health. Therefore, a status code of CA 725, Current Human Exposures Under Control, is recommended.

V. SUMMARY OF FOLLOW-UP ACTIONS

Although the quantitative, site-specific risk assessment for BUCC suggests further investigation/remediation to be unnecessary at all but SWMUs 6, 7, 8, and 9, groundwater at the site contains significant levels of the chemicals of concern. The primary source for these groundwater contaminants are residual wastes buried in former wastewater treatment basins

across the site. Therefore, Blackman Uhler has also excavated waste sludge and contaminated subsoils from SWMUs 2, 3, 4, 10 and 13. A partial removal was conducted at SWMU 14. Blackman Uhler proposes to excavate waste sludge and contaminated subsoils remaining at SWMUs 14, 5, and 9 and to consolidate the remediation wastes in a second cell to be constructed at the CAMU. Blackman Uhler has constructed an impervious cap at the SWMUs 10, 25 and 26 locations and is proposing to construct additional caps at SWMU 1 and the Building 8 Area of Concern. The public will have an opportunity to review, in 2004, all proposed remedies at the Blackman Uhler Chemical Company site. Subsequent to the public comment period, Hazardous Waste Permit SCD 003 349 065 will be modified to incorporate approved remedies.

Version: Interim Final
2/5/99

ATTACHMENT 1
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA725)
Current Human Exposures Under Control

Facility Name: Blackman Uhler Chemical Company
Facility Address: 2155 West Croft Circle
Facility EPA ID #: SCD 003 349 065

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   X If yes - check here and continue with #2 below,

   ____ If no - re-evaluate existing data, or

   ____ If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors may be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination (YE status code) indicates that there are no unacceptable human exposures to contamination (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all contamination subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **contaminated**[1] above appropriately protective risk-based levels (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)	X			
Surface Water		X		
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			
Air (outdoors)		X		

____ If no (for all media) - skip to #6, and enter A "YE", status code after providing or citing appropriate levels, and referencing sufficient supporting documentation demonstrating that these levels are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each contaminated medium, citing appropriate levels (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) - skip to #6 and enter an "IN" status code.

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[1] "Contamination and contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based levels (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Rationale:

Sampling investigations conducted from October 1993 through May 2003 (References 1 through 11) indicate the presence of chlorinated solvents, volatile and semi-volatile organics, and metals within buried wastewater treatment sludge, and contaminated subsoils across the Blackman Uhler Chemical Company site. Contaminants detected within remediation wastes consolidated within the Corrective Action Management Unit are summarized in Table 1, along with their Region III US EPA preliminary risk-based screening concentrations calculated assuming an industrial exposure scenario. The remedial goal objectives summarized in Table 1 are site-specific soil concentrations that were calculated to be protective of groundwater (References 5, 7).

Contaminants detected within remediation wastes proposed to be capped at SWMU 1 are summarized in Table 2 (Reference 5). Residual soil contamination proposed to be capped at the Building 8 AOC is summarized in Table 3 (Reference 5). Residual soil contamination sealed beneath the composite 40 mil low density polyethylene/concrete cap constructed at the SWMU 10, 25, and 26 locations is summarized in Table 4 (Reference 5, 7, 8).

The highest concentrations of groundwater contamination at the Blackman Uhler Chemical Company site exist downgradient of the closed hazardous waste management unit- the Aeration Basin , also identified as SWMU 17 (Reference 11). The Aeration Basin was an unlined surface impoundment used in the treatment of industrial wastewater from 1972 until closure in 1987. Quarterly groundwater monitoring was conducted at Blackman Uhler Chemical Company from 1982 until 1996, when a semi-annual groundwater monitoring program was approved. Groundwater quality at the site is monitored in order to evaluate postclosure conditions downgradient of the Aeration Basin. Groundwater investigations, which were ultimately conducted on a site-wide basis, indicate the predominant groundwater contaminants at Blackman Uhler Chemical Company to be the following semi-volatile organic constituents: 5-cholor-2-methyl benzenamine, o-Toluidine-hydrochloride, p-chloroaniline, p-Chloro-m-cresol, 5-Nitro-toluidine, and chlorobenzene. Of these six semi-volatile organic constituents, the dye intermediate 5-chloro-2-methyl benzenamine, is found in the highest concentrations and is the most widespread in both saprolite and bedrock aquifers. Blackman Uhler Chemical Company installed a groundwater recovery and treatment system in 1990, which consists of three deep bedrock recovery wells (GM-18, GM-20, and GM-24). The groundwater recovery system has dewatered a significant volume of the saprolite aquifer, accelerating the transport of contaminants, into the underlying bedrock aquifer. Future groundwater monitoring data will be compared to historical trends in order to evaluate the success of source removal/stabilization activities in accelerating groundwater remediation at Blackman Uhler Chemical Company.

References:

Ref #1: Report of Findings - Building 8 Subsurface Investigation, dated October 1994

Ref #2: Report of Findings – RCRA Facility Investigation, revised July 1995

Ref #3: Report of Findings – Phase II RCRA Facility Investigation, dated August 11, 1997

Ref #4: Phase II RCRA Facility Investigation Progress Report, an Evaluation of No Further Action (NFA) Sites, dated February 1997

Ref #5: Corrective Action Measures Study Report, dated March 2000

Ref #6: Solid Waste Management Units 2,3,4 Corrective Measures Implementation Report – Spartanburg, South Carolina, dated October 24, 2000

Ref #7: Revisions and Responses to DHEC/EPA Comments on the Corrective Measures Study Report (March 2000), dated January 2001

Ref #8: Solid Waste Management Unit #10 Corrective Measures Implementation Report, dated February 1, 2001

Ref #9: Corrective Measures Investigation Sampling and Analyses- SWMU 14, dated September 2002

Ref #10: RCRA Facility Investigation Report of Findings Solid Waste Management Unit 24- Process Sewer System, revised May 2003

Ref #11: Semi-Annual and Annual Groundwater Monitoring Reports from January 1996 through January 2004

TABLE 1

Maximum contaminant concentrations detected within remediation wastes consolidated within, or to be consolidated within, a Corrective Action Management Unit

(i.e. remediation wastes from SWMUs 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14)

Contaminant	Contaminant Concentration (Maximum mg/kg)	Location where Maximum Concentration Detected	Industrial Region III RBC (mg/kg) [1,2]	Site Specific Remedial Goal Objectives (ppm)
Acetone	56	SWMU 6,7,8	20,000	1460
Acetophenone	72	SWMU 6,7,8	20,000	0.017
4-Aminobiphenyl[3]	12	SWMU 9	NA	NC
Aniline	370	SWMU 6,7,8	1,000	0.74
Antimony	21	SWMU 2,3,4	810	2.4
Arsenic	30	SWMU 6,7,8	3.8	20
Barium	240	SWMU 2,3,4	14,000	800
Benzene	0.018	SWMU 14	190	NC
Beryllium	3.9	SWMU 13	410	1.6
Cadmium	2.3	SWMU 13	200	2.0
Carbon Disulfide[4]	0.015	SWMU 14	20,000	NC
p-Chloroaniline	370	SWMU 6,7,8	810	60
Chlorobenzene	94	SWMU 2,3,4	4,000	40
Chlorobenzilate	4.7	SWMU 2,3,4	21	NC
5-Chloro-2-methyl benzenamine[5]	4,700	SWMU 6,7,8	9.9	0.046
4-Chloro-3-methylphenol (p-Chloro-m-cresol)[6]	1,200	SWMU 6,7,8	100,000	800

Contaminant	Contaminant Concentration (Maximum mg/kg)	Location where Maximum Concentration Detected	Industrial Region III RBC (mg/kg) [1,2]	Site Specific Remedial Goal Objectives (ppm)
Chromium	210	SWMU 5	610	40
Cobalt	62	SWMU 5	12,000	880
Copper	5,400	SWMU 2,3,4	8,100	520
1,2-Dichlorobenzene	65	SWMU 2,3,4	18,000	240
1,3-Dichlorobenzene	16	SWMU 2,3,4	6,100	NC
1,4-Dichlorobenzene	500	SWMU 2,3,4	230	30
3,3-Dichlorobenzidine	480	SWMU 6,7,8	12	0.06
2,4-Dichlorophenol[4]	18	SWMU 14	610	NC
Di-n-butyl phthalate	430	SWMU 2,3,4	20,000	1460
Ethylbenzene	2,600	SWMU 5	20,000	280
bis (2-Ethylhexyl) phthalate	460	SWMU 2,3,4	400	2.4
Lead	150	SWMU 5	750	6
Mercury	3.4	SWMU 2,3,4	610	0.8
Methacrylonitrile[4]	0.047	SWMU 2,3,4	20	NC
Methylene Chloride	0.036	SWMU 9	760	2.0
4-Methyl-2-pentanone	0.038	SWMU 2,3,4	16,000	NC
2-Methylphenol (o-cresol)	54	SWMU 6,7,8	100,000	800
Naphthalene	130	SWMU 2,3,4	4,100	292
1-Naphthylamine	51	SWMU 14	NA	NC
2-Naphthylamine[7]	340	SWMU 6,7,8	0.044	0.0002
Nickel	48	SWMU 6,7,8	4,000	292
m-Nitroaniline[8]	170	SWMU 6,7,8	610	0.88
o-Nitroaniline	340	SWMU 6,7,8	NA	NC

Contaminant	Contaminant Concentration (Maximum mg/kg)	Location where Maximum Concentration Detected	Industrial Region III RBC (mg/kg) [1,2]	Site Specific Remedial Goal Objectives (ppm)
Nitrobenzene	210	SWMU 2,3,4	100	1.41
5-Nitro-o-toluidine	7,600	SWMU 6,7,8	170	0.81
Pentachlorophenol	980	SWMU 2,3,4	47	0.4
Phenanthrene[3]	4.9	SWMU 13	NA	NC
Silver	4.6	SWMU 2,3,4	1,000	40
Styrene[4]	7.5	SWMU 14	41,000	NC
Tetrachloroethene	110	SWMU 2,3,4	110	2.0
2,3,4,6-Tetrachlorophenol	1.5	SWMU 2,3,4	6,100	NC
Tin	3,100	SWMU 9	100,000	8,800
Toluene	65,00	SWMU 6,7,8	40,000	400
o-Toluidine[9]	610	SWMU 6,7,8	23	0.14
1,2,4-Trichlorobenzene	140	SWMU 2,3,4	2,000	28
Trichloroethane[4]	0.130	SWMU 14	520	NC
Vanadium	380	SWMU 5	1,400	100
Vinyl Chloride[4]	0.009	SWMU 14	3.0	NC
Xylene	12,500	SWMU 5	100,000	4,000
Zinc	20,000	SWMU 6,7,8	61,000	4,400

NA Appropriate toxicological data is unavailable. EPA has not developed a reference dose and/or slope factor for this constituent and no structurally similar surrogate could be found.

NC Remedial Goal Objective (RGO) for the protection of groundwater was not calculated. Either the contaminant was not detected in five percent of the soil samples, or no Safe Drinking Water Act Maximum Contaminant Limit and no Region III risk-based concentration for tap water were available from which to calculate a RGO.

*1 EPA 1998 Risk-Based Concentration Tables (October 28, 1998). Region III, U.S. Environmental Protection Agency, Philadelphia, Pennsylvania.

*2 All non-carcinogenic risk based concentrations have been adjusted to reflect a hazard quotient of 0.1 during the evaluation of chemicals of potential concern in order to account for multiple contaminants.

*3 EPA has not developed a reference dose or slope factor for 4-Aminobiphenyl or Phenanthrene for use in risk assessments, and suitable surrogates could not be identified. Therefore, these constituents were not evaluated in BUCC's quantitative, site-specific risk assessment.

*4 EPA 2000 Risk-Based Concentration Tables (April 13, 2000). Region III, U.S. Environmental Protection Agency, Philadelphia, Pennsylvania

*5 EPA has not developed a reference dose or slope factor for 5-chloro-2-methyl benenamine for use in risk assessments. The toxicology for a structurally similar surrogate, 4-chloro-2-methylaniline, was substituted for 5-chloro-2-methyl benzenamine, to assess risk at BUCC.

*6 EPA has not developed a reference dose for 4-chloro-3-methylphenol for use in risk assessments. The toxicology for a structurally similar surrogate, 2 methyl phenol, was substituted for 4-chloro-3-methylphenol, to assess risk at BUCC.

*7 EPA has developed a provisional cancer slope factor for 2-napthylamine of 130 $(mg/kg\text{-}day)^{-1}$. This provisional value was used in BUCC's quantitative, site-specific risk assessment.

*8 EPA has derived a chronic oral reference dose for o-nitroaniline of $6x10^{-5}$ mg/kg/d. This toxicological data was used as a surrogate for m-nitroaniline to assess risk at the BUCC site.

*9 EPA has not developed a reference dose or slope factor for o-toluidine for use in risk assessments. The toxicology for a structurally similar surrogate, p-toluidine, was substituted for o-toluidine, to assess risk at BUCC.

TABLE 2

Summary of Contaminants detected within Sludge and Contaminated Subsoil at SWMU 1

Contaminant	Number of Detects	Number of Samples	Maximum Detects (mg/kg)	US EPA Region III Industrial RBC[1,2] (mg/kg)	Groundwater RGO (mg/kg)
Arsenic	3	8	65	3.8	20
Barium	8	8	140	14,000	800
Chromium	8	8	1,800	610	40
Lead	8	8	43	750	6
Silver	7	8	3.5	1,000	40
4-Chloro-3-methylphenol	5	8	15	100,000	800
5-Chloro-2-methyl benzenamine	8	8	6,900	9.9	0.046
5-Nitro-o-toluidine	1	8	0.38	170	0.81
Aniline	1	8	1.10	1,000	0.74
Bis(2-ethylhexyl)phthalate	3	8	30	400	2.4
o-Toluidine	1	8	0.36	23	0.14
p-Chloroaniline	1	8	1.30	810	60
1,2,4-Trichlorobenzene	6	8	25	2,000	28
1,2-Dichlorobenzene	3	8	0.02	18,000	240
1,3-Dichlorobenzene	2	8	0.07	6,100	NC
1,4-Dichlorobenzene	6	8	17	230	30
2-Butanone	7	8	0.07	100,000	760
2-Hexanone	4	8	0.04	8,100	NC
Acetone	8	8	0.48	20,000	1460
Benzene	1	8	0.06	190	NC
Chlorobenzene	2	8	0.27	4,000	40
Ethylbenzene	5	8	0.14	20,000	280
m/p Xylene	6	8	0.52	100,000	4,000
Methylene Chloride	1	8	0.01	760	2.0
0 Xylene	5	8	0.16	100,000	4,000
Toluene	1	8	0.11	40,000	400

[1] EPA 1998 Risk-Based Concentration Tables (October 28, 1998). Region III, U.S. Environmental Protection Agency, Philadelphia, Pennsylvania

[2] All non-carcinogenic risk based concentrations have been adjusted to reflect a hazard quotient of 0.1 during the evaluation of chemicals of potential concern in order to account for multiple contaminants.

NC Remedial Goal Objective (RGO) for the protection of groundwater was not calculated. Either the contaminant was not detected in five percent of the soil samples, or no Safe Drinking Water Act Maximum Contaminant Limit and no Region III risk-based concentration for tap water were available from which to calculate a RGO.

TABLE 3

Residual Soil Contamination at the Building 8 Area of Concern

Contaminant	Detects	Samples	Maximum Detects (mg/kg)	US EPA Region III Industrial RBC[1,2] (mg/kg)	Groundwater RGO (mg/kg)
Antimony	1	6	6.4	810	2.4
Arsenic	2	6	20	3.8	20
Barium	6	6	120	14,000	800
Beryllium	6	6	2.9	410	1.6
Cadmium	6	6	1.9	200	2.0
Chromium	6	6	120	610	40
Cobalt	6	6	31	12,000	880
Copper	6	6	71	8,100	520
Lead	5	6	15	750	6
Nickel	6	6	41	4,000	292
Tin	5	6	29	100,000	8,800
Vanadium	6	6	180	1,400	100
Zinc	6	6	73	61,000	4,400
2,4-Dinitrophenol	2	6	4.2	410	NC
2,6-Dinitrotoluene	1	6	1	200	NC
4-Chloro-3-methylphenol	2	6	8.7	100,000	800
4-Nitrophenol	2	6	9.7	1,600	Nc
5-Chloro-2-methyl benzenamine	2	6	3.1	9.9	0.046
5-Nitro-o-toluidine	3	6	9,100	170	0.81
Acetonitrile	1	6	0.068	12,000	NC
Bis(2-ethylhexyl)phthalate	1	6	7.6	400	2.4
Di-n-butyl phthalate	1	6	0.99	20,000	1,460
N-Nitrosodimethylamine	2	6	8.9	0.1	NC
p-Chloroaniline	1	6	1.1	810	60
1,4-Dichlorobenzene	1	6	0.031	230	30
4-Methyl-2-pentanone	1	6	0.019	16,000	NC
Acetone	2	6	0.58	20,000	1,460

[*1] EPA 1998 Risk-Based Concentration Tables (October 28, 1998). Region III, U.S. Environmental Protection Agency, Philadelphia, Pennsylvania

[*2] All non-carcinogenic risk based concentrations have been adjusted to reflect a hazard quotient of 0.1 during the evaluation of chemicals of potential concern in order to account for multiple contaminants.

NC Remedial Goal Objective (RGO) for the protection of groundwater was not calculated. Either the contaminant was not detected in five percent of the soil samples, or no Safe Drinking Water Act Maximum Contaminant Limit and no Region III risk-based concentration for tap water were available from which to calculate a RGO.

TABLE 4

Residual Soil Contamination at the SWMU 10, 25, and 26 Locations

Contaminant	Detects	Samples	Maximum Detects (mg/kg)	US EPA Region III Industrial RBC[1,2] (mg/kg)	Groundwater RGO (mg/kg)
Arsenic	3	11	5.3	3.8	20
Barium	11	11	79	14,000	800
Beryllium	9	11	2.3	410	1.6
Chromium	8	11	58	610	40
Cobalt	11	11	56	12,000	880
Copper	11	11	210	8,100	520
Lead	10	11	120	750	6
Mercury	1	11	0.25	610	0.8
Nickel	11	11	89	4,000	292
Tin	11	11	570	100,000	8,800
Vanadium	11	11	210	1,400	100
Zinc	11	11	480	61,000	4,400
Acetophenone	1	11	1.3	20,000	0.017
Anthracene	1	11	1.0	NA	NA
Benzo(a)anthracene	1	11	2.1	8	NC
Benzo(b/k)fluoranthene	1	11	2.6	8	NC
Benzo(a)pyrene	1	11	1.5	1	NC
Bis(2-ethylhexyl)phthalate	3	11	2.8	400	2.4
4-Chloroaniline	2	11	3.4	810	60
5-Chloro-2-methyl benzenamine	7	11	41	9.9	0.046
Chrysene	1	11	2.1	780	NC
Di-n-butyl phthalate	1	11	1.4	20,000	1460
Fluoranthene	1	11	3.9	NA	NC
3-Nitroaniline	2	11	4.1	610	0.88
5-Nitro-o-toluidine	2	11	1.5	170	0.81
Phenanthrene	1	11	4.2	NA	NC
Pyrene	1	11	3.2	6,100	NC
o-Toluidine	2	11	3.4	23	0.14
Acetone	4	11	0.71	20,000	1460
2-Butanone	2	11	0.026	100,000	760
Chlorobenzene	1	11	0.062	4,000	40
1,2 Dichlorobenzene	1	11	0.047	18,000	240
1,4 Dichlorobenzene	2	11	0.095	230	30
Methylene Chloride	1	11	0.022	760	2.0
Toluene	1	11	0.015	40,000	400
m/p Xylene	1	11	0.036	100,000	4,000

[*1] EPA 1998 Risk-Based Concentration Tables (October 28, 1998). Region III, U.S. Environmental Protection Agency, Philadelphia, Pennsylvania

[*2] All non-carcinogenic risk-based concentrations have been adjusted to reflect a hazard quotient of 0.1 in order to select chemicals of potential concern.

NA Appropriate toxicological data is unavailable. EPA has not developed a reference dose and/or slope factor for this constituent and no structurally similar surrogate could be found.

NC Remedial Goal Objective (RGO) for the protection of groundwater was not calculated. Either the contaminant was not detected in five percent of the soil samples, or no Safe Drinking Water Act Maximum Contaminant Limit and no Region III risk-based concentration for tap water were available from which to calculate a RGO.

3. Are there **complete pathways** between contamination and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table
Potential **Human Receptors** (Under Current Conditions)

Contaminated Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	No	No	No	No	N/L	N/L	No
Surface Soil	No	No	No	No	N/L	N/L	No
Subsurface Soil	No	No	No	No	N/L	N/L	No

Instructions for Summary Exposure Pathway Evaluation Table:

1. For Media which are not contaminated as identified in #2, please strike-out specific Media, including Human Receptors spaces, or enter "N/C" for not contaminated.

2. Enter "yes" or "no" for potential completeness under each Contaminated Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations, some potential Contaminated Media - Human Receptor combinations (Pathways) are not assigned spaces in the above table (i.e, **N/L - not likely**). While these combinations may not be probable in most situations, they may be possible in some settings and **should be added as necessary**.

__X__ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

____ If yes (pathways are complete for any Contaminated Media - Human Receptor combination) - continue after providing supporting explanation.

____ If unknown (for any Contaminated Media - Human Receptor combination) - skip to #6 and enter "IN" status code

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Rationale:

Blackman Uhler Chemical Company has conducted a quantitative, site-specific risk assessment to better evaluate the hazards associated with exposure to chemicals present in buried wastewater treatment sludge and contaminated subsoils at the site (Reference 1). Nine exposure units were identified for surface and/or subsurface soil and these exposure units correspond to SWMUs 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 26 and the Building 8 Area of Concern. The quantitative, site-specific risk assessment indicated that, except for SWMUs 6, 7, 8, and 9, further investigation and/or remediation was generally not warranted. At all units, the cancer risk was estimated to be within, or below the range of $1x10^{-6}$ to $1x10^{-4}$ which is used as the point of departure for making risk management decisions at chemical release sites. On September 4, 2003, SWMU 9 was fenced and signs posted to prevent exposure. Because Blackman Uhler has constructed the initial cell of the CAMU over SWMUs 6, 7 and 8, risk of exposure to subsurface waste and contaminated subsoil at SWMUs 6, 7 and 8 by a construction worker is only hypothetical; there are currently no completed pathways of exposure to units that would represent a hazard to human health (References 1, 2, 3). Therefore, a status code of CA 725, Current Human Exposures Under Control, is recommended for this site.

Although the quantitative, site-specific risk assessment for BUCC suggests further investigation/remediation to be unnecessary at all but SWMUs 6, 7, 8, and 9, groundwater at the site contains significant levels of the chemicals of concern (Reference 4). The primary source for these groundwater contaminants are residual wastes buried in former wastewater treatment basins across the site. Therefore, Blackman Uhler has also excavated waste sludge and contaminated subsoils from SWMUs 2, 3, 4, 10 and 13 (References 5, 6, 7). A partial removal was conducted at SWMU 14 (Reference 8). Blackman Uhler proposes to excavate waste sludge and contaminated subsoils remaining at SWMUs 14, 5, and 9 and consolidate the remediation wastes in a second cell to be constructed at the CAMU (Reference 9). Blackman Uhler has constructed an impervious cap at SWMUs 10, 25, and 26 (Reference 6), and is proposing additional caps at SWMU 1 and the Building 8 Area of Concern (Reference 9).

Groundwater at Blackman Uhler Chemical Company is not used for domestic or industrial purposes. Under current and likely future exposure scenarios at Blackman Uhler Chemical Company, there are no completed pathways for exposure to contaminated groundwater. There are no completed pathways for exposure to contaminated groundwater that has migrated from the site known at this time (Reference 10).

References:

Ref #1: Human Health Risk Assessment for the Blackman Uhler Chemical Plant, Spartanburg, South Carolina, by Kleinfelder, Inc. dated June 1999

Ref #2: Corrective Action Measures Study Report, dated March 2000

Ref #3: Revisions and Responses to DHEC/EPA Comments on the Corrective Measures Study Report (March 2000), dated January 2001

Ref #4: Semi-Annual and Annual Groundwater Monitoring Reports from January 1996 through January 2004

Ref #5: Solid Waste Management Units 2,3,4 Corrective Measures Implementation Report – Spartanburg, South Carolina, dated October 24, 2000

Ref #6: Solid Waste Management Unit #10 Corrective Measures Implementation Report, dated February 1, 2001

Ref #7: RCRA Facility Investigation Report of Findings Solid Waste Management Unit 24- Process Sewer System, revised May 2003

Ref #8: Corrective Measures Investigation Sampling and Analyses- SWMU 14, dated September 2002

Ref #9: Correspondence dated June 29, 2003 titled "HSWA Corrective Action at the Blackman Uhler Chemical Company" from Marianna DePratter to Project File, dated July 29, 2003

Ref #10: Final Case Development Investigation Evaluation (CDIE) Report by the US EPA Region IV Science and Ecosystems Support Division, Athens, Georgia, dated March 2003

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **significant**[4] (i.e., potentially unacceptable because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable levels (used to identify the contamination); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable levels) could result in greater than acceptable risks)?

____ If no (exposures can not be reasonably expected to be significant (i.e., potentially unacceptable) for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to contamination (identified in #3) are not expected to be significant.

____ If yes (exposures could be reasonably expected to be significant (i.e., potentially unacceptable) for any complete exposure pathway) - continue after providing a description (of each potentially unacceptable exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to contamination (identified in #3) are not expected to be significant.

____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):_____
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[4] If there is any question on whether the identified exposures are Asignificant@ (i.e., potentially Aunacceptable@) consult a human health Risk Assessment specialist with appropriate education, training and experience.

5 Can the significant **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all significant exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all significant exposures to contamination are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be unacceptable)- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially unacceptable exposure) - continue and enter "IN" status code

Rationale and Reference(s):_____

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility)[5]:

__X__ YE - Yes, Current Human Exposures Under Control has been verified. Based on a review of the information contained in this EI Determination, Current Human Exposures are expected to be Under Control at the Blackman Uhler Chemical Company, EPA ID # SCD 003 349 065, located at 2155 West Croft Circle, Spartanburg, South Carolina under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - Current Human Exposures are NOT Under Control.

____ IN - More information is needed to make a determination.

Completed by (signature) Date
(print)
(title)

Supervisor (signature) Date
(print)
(title)
(EPA Region or State)

Locations where References may be found:
Bureau of Land and Waste Management, South Carolina Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201

Contact telephone and e-mail numbers
(name) Marianna DePratter
(phone #) 803.896.4018
(e-mail) depratmp@34.dhec.state.us

[5] **FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.**